CLAIMS

What is claimed is:

1.   A low-order interpolation filter for video or image signals, comprising:

     a positioning vector generator operative to generate a positioning vector indicative of a desired position of an output sample relative to a set of input samples according to a scaling factor; and

     a coefficient generator that generates interpolation coefficients as a function of the positioning vector, each of the interpolation coefficients varying non-linearly with respect to the positioning vector, the coefficients being associated with the input sample to provide a scaled output sample.

2.   The filter of claim 1, the positioning vector generator further comprising a discrete time oscillator that derives the positioning vector and a pixel address based on the input sample and the scaling factor.

3.   The filter of claim 1, the coefficient generator further comprising a lookup table preprogrammed with coefficient values that are selected based on the positioning vector.

4.   The filter of claim 1, further comprising a memory configured to store input sample data according to a mode of scaling being performed and a number of filter taps associated with the filter.

5.   The filter of claim 4, the mode of scaling being performed comprising at least one of horizontal scaling, vertical scaling, and temporal scaling.

6.   The filter of claim 4, the number of filter taps being less than or equal to five.

7.   The filter of claim 4, the number of filter taps being selected depending on the mode of scaling being performed.

8.   The filter of claim 1, the output sample being represented by

$Y_n = C_0 \cdot X_n + C_1 \cdot X_n \cdot Z^{-1} .... + C_{m-1} \cdot X_n \cdot Z^{-(m-1)}$, where Y_n defines the output sample, X_n defines the input sample, m defines the number of filter taps, C_0 through C_{m-1} define respective interpolation coefficients, and Z^{-1} through $Z^{-(m-1)}$ define delay elements associated with scaling being performed.

9.   The filter of claim 8, the delay elements Z^{-1} through $Z^{-(m-1)}$ being indicative of an amount of delay associated with buffering the input sample X_n, the amount of delay being proportional to a type of scaling being performed.

10.   A sample rate converter that converts a set of input samples at a first clock frequency into an output sample at a second clock frequency, comprising:

      a positioning vector generator operative to provide a positioning vector based on the set of input samples and a desired scaling factor functionally related to the first and second clock frequencies;

      a delay component that delays the input sample and generates delay elements related to delays associated with processing the set of input samples; and

      a low order interpolator that performs linear interpolation on the set of input samples by selectively applying a number of interpolation coefficients and corresponding delay elements to the set of input samples so as to transform the set of input samples into the output sample, the interpolation coefficients varying non-linearly with respect to the positioning vector.

11.   The converter of claim 10, the interpolator further comprising a lookup table preprogrammed with the interpolation coefficients, the lookup table providing the interpolation coefficients based on the positioning vector.

12.   The converter of claim 10, the delay component generating the delay elements according to a type of scaling being implemented by the converter.

13.   The converter of claim 12, the type of scaling being selected from a group comprising horizontal scaling, vertical scaling and temporal scaling.

14.   The converter of claim 12, the number of interpolation coefficients being less than or equal to five.

15.   The converter of claim 10, the interpolator generating the output sample as $Y_n = C_0 \cdot X_n + C_1 \cdot X_n \cdot Z^{-1} .... + C_{m-1} \cdot X_n \cdot Z^{-(m-1)}$, where Y_n defines the output sample, X_n defines an input sample, m defines a number of filter taps of the interpolator, C_0 through C_{m-1} define respective interpolation coefficients, and Z^{-1} through $Z^{-(m-1)}$ define delay elements associated with scaling being performed.

16.   The converter of claim 15, the delay elements Z^{-1} through $Z^{-(m-1)}$ being indicative of an amount of delay associated with buffering the input sample X_n, the amount of delay being proportional to a type of scaling being performed.

17.   A low-order interpolation filter for implementing sample rate conversion of an input signal, comprising:

        means for generating a positioning vector indicative of a desired position of an output sample relative to a set of input samples;

        means generating interpolation coefficients as a function of the positioning vector, each of the interpolation coefficients varying non-linearly with respect to the positioning vector; and

        means for applying the coefficients to set of input samples to provide a scaled output sample.

18.   The filter of claim 17, the means for generating interpolation coefficients further comprising lookup means programmed for providing the interpolation coefficients according to the positioning vector.

19.   A method for sample rate conversion, comprising:

generating a positioning vector indicative of a desired relative position of an output sample relative to a set of input samples; and

applying a number of interpolation coefficients to the set of input samples to weight the set of input samples and, in turn, convert the set of input samples from an input clock frequency to an associated output clock frequency, the interpolation coefficients varying non-linearly with respect to the positioning vector.

20.   The method of claim 19, further comprising determining each of the interpolation coefficients as a function of the positioning vector.

21.   The method of claim 20, the determining employing a lookup table programmed with coefficient values as a function of positioning vector values.

22.   The method of claim 19, the number of interpolation coefficients being five or less.

23.   The method of claim 22, further comprising generating the output sample as $Y_n = C_0 \cdot X_n + C_1 \cdot X_n \cdot Z^{-1} .... + C_{m-1} \cdot X_n \cdot Z^{-(m-1)}$, where Y_n defines the output sample, X_n defines an input sample, m defines the number of interpolation coefficients, C_0 through C_{m-1} define respective interpolation coefficients, and Z^{-1} through $Z^{-(m-1)}$ define delay elements that identify delay associated with a type of scaling being performed.

24.   The method of claim 23, further comprising buffering the input sample, the delay elements Z^{-1} through $Z^{-(m-1)}$ being indicative of an amount of delay associated with the buffering which depends on the type of scaling being performed.